geal ganglia in the Lamellibranchiata appear homologous with those of *Doris*.

Having determined the existence of a true sympathetic or organic nervous system in *Doris*, the authors feel themselves more in a position to trace a parallelism between the œsophageal nervous centres of these Mollusca and the cerebro-spinal system of the Vertebrata, and accordingly they find there is a strict analogy between them, even to the individual pairs of ganglia of which they respectively consist, the general result being that the whole of the ganglia, grouped around the œsophagus in these Mollusca, answers to the encephalon, and a small portion of the enrachidion, of the Vertebrata.

Organs of the Senses.—The auditory capsules are microscopic, composed of two concentric vesicles, the inner enclosing numerous, oval, nucleated otolithes. *The eyes* are minute black dots, beneath the skin, attached by a pedicle to a small ganglion. They are made up of a cup of pigment, receiving from behind the nerve, and lodging in front a lens, having in advance of it a cornea, the whole enclosed by a fine capsule. The authors believe they have shown the dorsal tentacles to be the *olfactory organs*.

The organs of touch are, the general surface of the skin, but more particularly the oral tentacles or veil. *Taste* is most probably located in the lips and channel of the mouth, the tongue being a prehensile organ, and ill-adapted as the seat of such a function.

In conclusion, the authors comment on the high organization of the *Doridæ*, and express their belief that the genus, as at present understood, will require to be broken up into several groups.

March 11, 1852.

THE EARL OF ROSSE, President, in the Chair.

The following papers were read :—

1. "Remarks on certain points in Experiments on the Diffraction of Light." By the Rev. Baden Powell, M.A., F.R.S. &c., Savilian Professor of Geometry in the University of Oxford. Received Nov. 10, 1851.

The chief object of this communication was to examine into the experimental evidence adduced in a recent paper by Lord Brougham (Phil. Trans., 1850, Part I.), without at all entering on the question of the peculiar theory therein proposed, solely with the view of inquiring how far the actual new facts adduced, when simply stated and divested of the peculiar theoretical language in which they are delivered, do or do not militate against the undulatory theory.

The author had devoted a portion of the summer to a careful repetition of all the chief experiments described in the paper referred to, in some of which, however, he had been unable to reproduce the results described. After referring to the preliminary experiments

described in that paper, and the attempt there made to refute the theory of interferences, he remarks, that the theory of interferences explains perfectly *both* the internal and external fringes of a shadow; that the *breadth* of the fringes has no dependence on the *length of route* of the rays, but it has on the *angle* at which they intersect; and that interference also perfectly explains the fringes, even when the action is wholly *on one side* of the ray or edges.

Passing from these points of confessedly less importance, the author proceeds to consider the most material and fundamental experiment, in which, when fringes are formed by the edge of an opake body, if a second edge be placed at a greater distance along the ray, from the origin, on the *same* side as the first edge, it produces *no change* in the fringes; but on the opposite side it *does*, the fringes being shifted in position towards the first side; or, in other words, that the second edge, in the one case, has no power of producing further diffraction, in the other it has; and which has been viewed as supporting the theory of a peculiar action exerted by the edge upon the ray passing near it, by which it is disposed or indisposed for further *flexure* according to the conditions just expressed.

With reference to the edges on opposite sides, he observes, that when they are at the same distance from the origin, and form there a narrow aperture, they give (as is well known) fringes on each side extending into the shadow, with a white centre. As one edge is removed successively further from the origin along the ray and nearer to the screen, the fringes on that side dilate, become faint, and at length disappear; so that beyond a certain distance there remain only the fringes on the other side, or on that of the edge nearest the origin; which diverge further into the shadow on that side as the breadth of the effective aperture is diminished. In this way, then, the second edge, if beyond the limits of distance just mentioned, will cause an appearance of fringes on the side towards the first edge, diverging into the shadow.

When the two edges are at the same distance from the origin, forming a narrow aperture, the nature of the fringes is perfectly explained and reduced to quantitative results by Fresnel's theory. When the second edge is placed at a greater distance along the ray, this would be equivalent to a wide aperture placed obliquely to the direction of the ray, so as to be effectively as narrow as before. On the undulatory theory, this particular case has not been actually reduced to calculation, and it appears that it would certainly involve most complicated and difficult analysis to do so. It has however been treated in a general way by Fresnel himself (Mémoire sur la Diffraction, Mém. de l'Instit., tom. v. note, p. 452), who points out the general conditions for determining the condition of a fringe, and shows that the fringes will in this case undergo a modification, and will *not be symmetrical, but more expanded on one side than on the other*; which exactly agrees with observation.

After some remarks having the same bearing on other facts and propositions in the paper referred to, the author concludes by observing,—I have thus, I trust, with perfect impartiality, gone through

all the main experimental points of the investigation; and, upon the whole, I can perceive nothing substantiated which is positively *irreconcileable* with the principle of interference; while the new modifications of the phænomena here presented, so far as general considerations can be relied on, seem sufficiently conformable to the undulatory theory; but as to their more *exact* quantitative explanation, no definitive opinion can be pronounced until certain analytical investigations of great length and complexity shall have been gone through; by which alone theory can be brought into exact and satisfactory comparison with experiment.

2. "On the Lunar Atmospheric Tide at Singapore." By Captain C. M. Elliot, M.E., F.R.S. Received Dec. 18, 1851.

The discussion of the barometric observations at St. Helena by Colonel Sabine having clearly and decidedly shown the moon's influence on the atmosphere, the author determined to discuss in a similar manner the barometric observations at Singapore. The results of this discussion are given in the present communication.

In order that a comparison might be made between the results at Singapore and at St. Helena, he copied to a considerable extent the form of the different lunar tables drawn up by Colonel Sabine in his paper published in the Philosophical Transactions.

The observatory at Singapore was in latitude 1° 18′ 32″ N. and longitude 103° 56′ 30″ E. of Greenwich. The cistern of the barometer, one of Newman's, having a tube 0·532 inch in diameter, was a few feet above high-water mark. The observations, during the whole of 1841 and the early part of 1842 and that of 1843, were made at every two hours; during the remainder of the time, to the close of 1845, at every hour.

The diurnal variation of the barometer having been eliminated, by deducting the mean monthly height at each hour, from the height given by observation, the residual quantities were arranged in tables; and the observation corresponding the nearest in time to the moon's superior culmination for each day being marked as 0 hour of lunar time, the whole were again rearranged in tables according to lunar hours. The variation or range of the mean of the sums of the differences thus arranged is exhibited in a table, in the last column of which are given the means of all the hours for each period of six months. In a second table are given the differences between these mean results in the last column of the preceding table and the numbers corresponding to the several hours in the other columns.

The means of the complete years of observation, 1841, 1844, 1845, are shown in a third table, in which are also given the means of the first six months of 1842 and 1843, during which two-hourly observations were made, and the means of the latter halves of these years, during which the observations were made hourly.

The means of the twenty-four months of the two-hourly observations, and of the thirty-six months of the hourly observations, are given in Table IV. Finally, Table V. exhibits the results of the observations of three years, so combined as to show the effect on